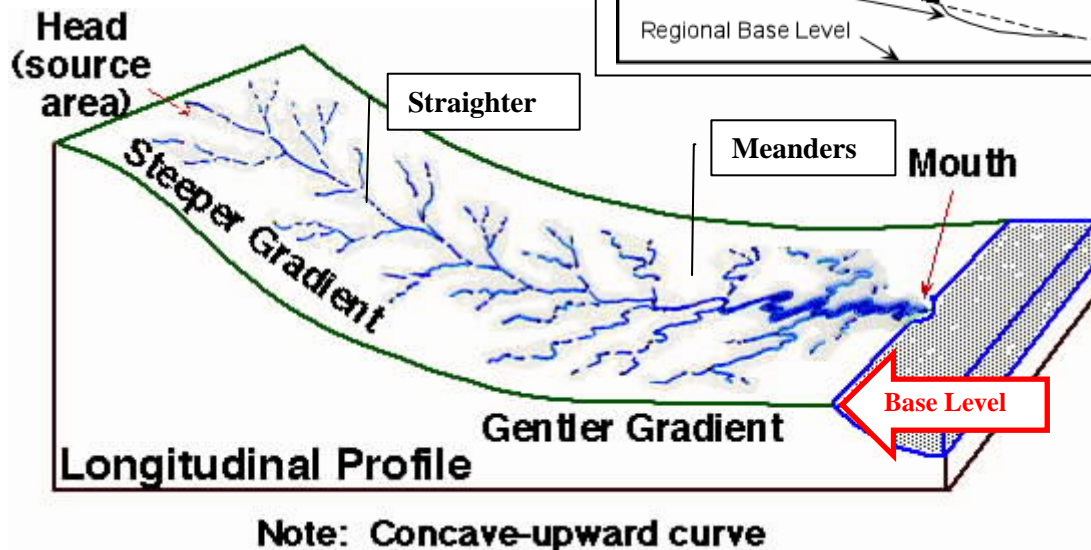


Streams

The Graded Stream = at equilibrium
Just enough energy to carry its load

Gradient - Slope concave-up
longitudinal profile



Base level – level below which a river cannot erode.

- Local base level – dam, lake, resistant rock (“fall line”)
- Ultimate base level – ocean, inland basin

Stream will erode or deposit to maintain grade.

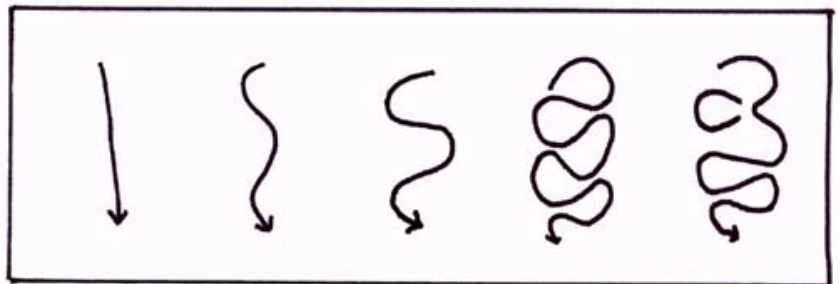
Meander development (Maiandros River, Turkey)

Streams straight where
gradient is steep and fast

Meander where
gradient is low

Meanders

- lengthen river, reduce grade
- migrate downstream
- alluvial fans



Flood plains

Natural Levees

- thickest, coarsest sed. deposited close to channel during floods
- finer sed. dep. on flood plain ∴ fertile – silt, clay
- many river towns are BELOW the level of the river water!
- man-made levees make floods less frequent but worse when they happen

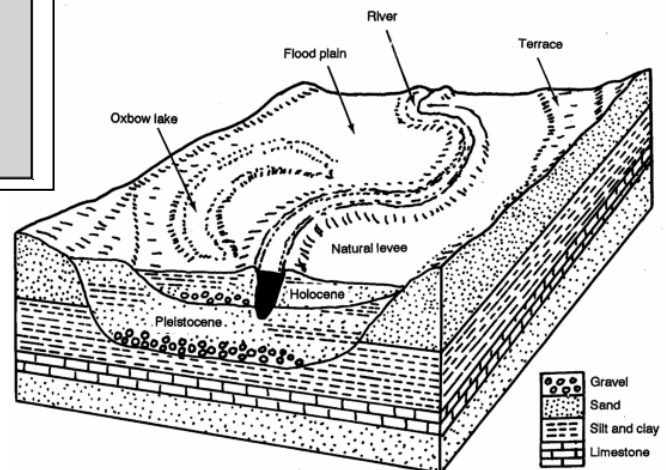
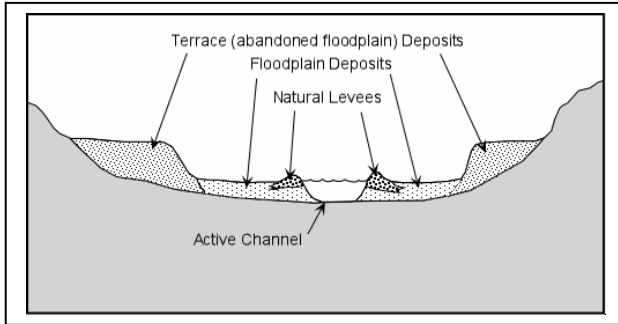
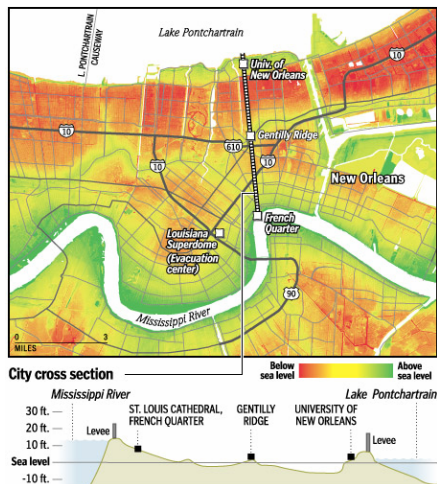


Figure 2-18. Alluvial valley



Orleans, LA is below sea level

Braided Streams

- large variation in volume
- large sediment load
- alluvial fans, glacial outwash



Sediment Transport

Discharge \equiv total volume of water (m^3/sec)

- depends on channel x-sect and velocity
- Mississippi – $1400 \text{ m}^3/\text{sec}$ – $57,000 \text{ m}^3/\text{sec}$ (avg. 18,000)

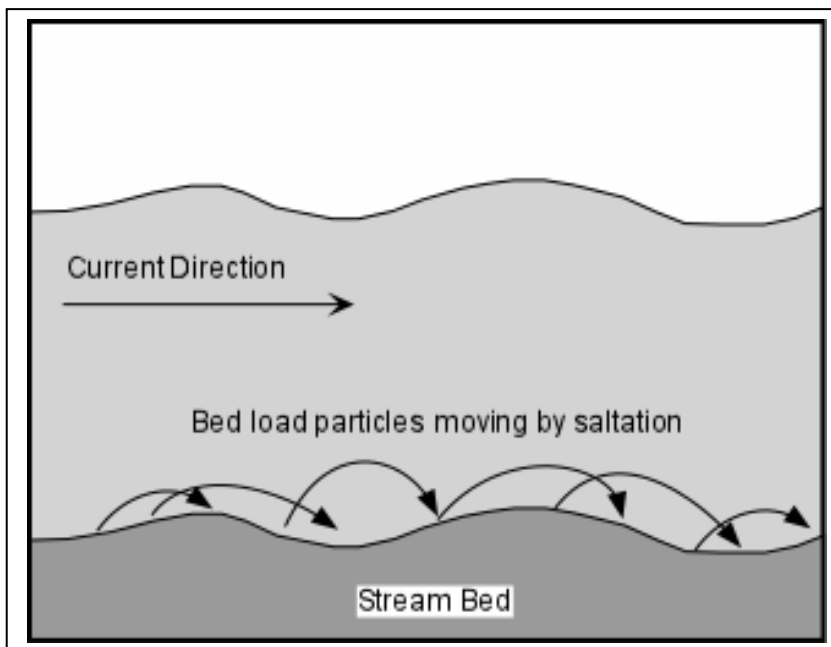
Capacity \equiv total volume of sediment

- \propto discharge
- most rivers don't carry max. capacity because its not available
- **load** \equiv actual sediment carried

Competence \equiv largest particle transported

- \propto velocity

All change for a stream along course, over time, with seasons, etc.



Dissolved load (ions)

* chemical wx.

Suspended load

* silt, clay

Bed load

* rolling

* saltation

* lift (Bernoulli's principle)

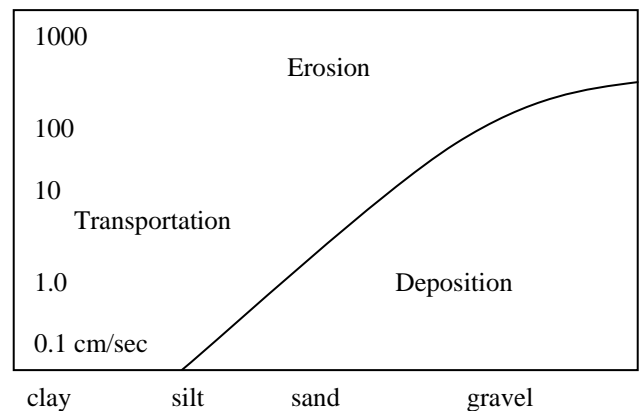
Velocity vs. grain size

Silt & clay is “sticky”

Gravel is heavy

Sand easiest to erode & transport

\therefore beaches



Deltas

Named for Greek Δ

Existence and type depend on:

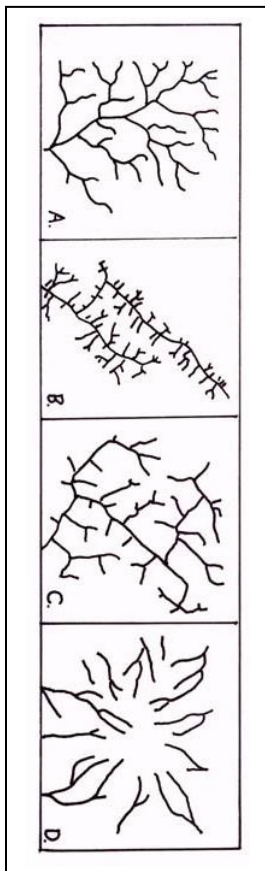
- river discharge and sed. load
- wave action
- tidal range

Distributary channels change over time



Drainage patterns

Depend on underlying geology. Geologic structure may “steer” the drainage.



Dendritic

- relatively uniform rock

Trellis

- parallel ridges caused by tilted sed. layers

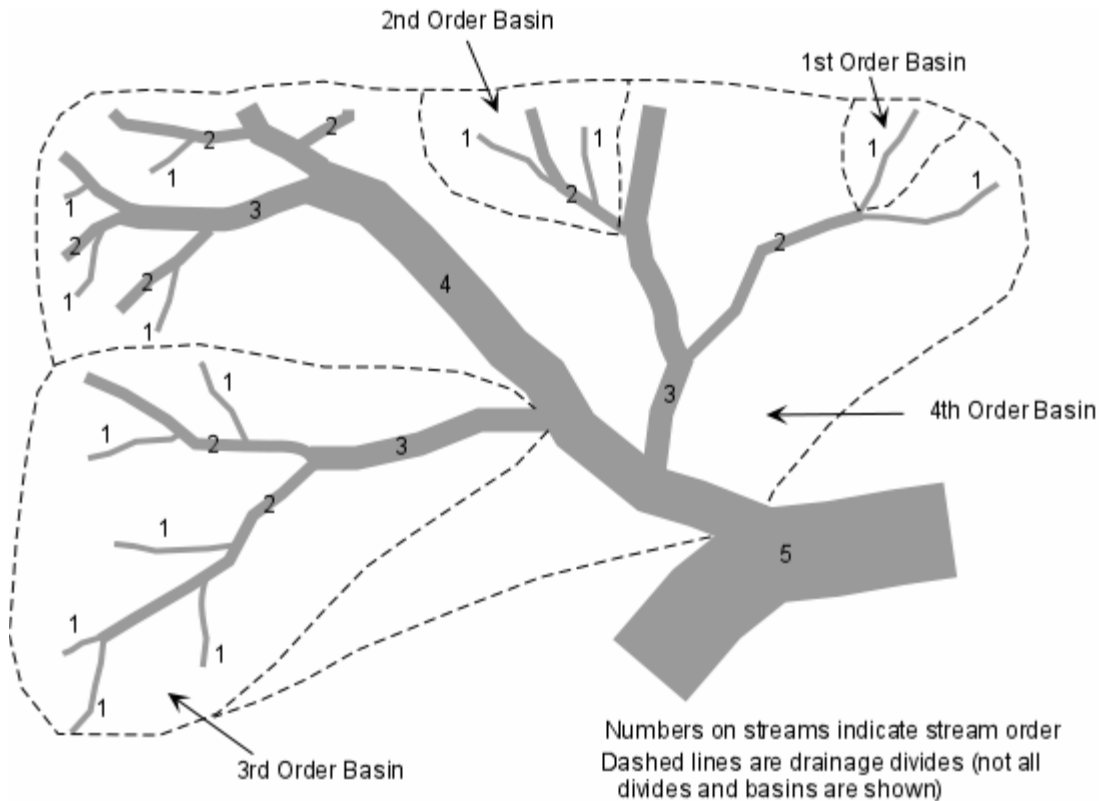
Rectangular

- joints and faults

Radial

- domes and volcanoes

Catchment Basins (Watersheds)



- Basins are separated by “**divides**” which are generally on ridges.
- Tributaries of smaller order join larger order
- Acute “V” in a branch points upstream

Continental Divide (Great Divide) = separates the watersheds of the Pacific Ocean from those of the Atlantic

North America has four continental divides:

1. The Great Divide (Continental Divide)
= Atlantic/Pacific
2. The Northern Divide (Laurentian Divide)
= Atlantic/Arctic
3. The St. Lawrence Seaway Divide
= Great Lakes/Atlantic Ocean
4. The Eastern Continental Divide
= Gulf of Mexico/Atlantic Ocean

